EQUATIONS WITH FRACTIONAL COEFFICIENTS

Students used scale factors (multipliers) to enlarge and reduce figures as well as increase and decrease quantities. All of the original quantities or lengths were multiplied by the scale factor to get the new quantities or lengths. To reverse this process and scale from the new situation back to the original, we divide by the scale factor. Division by a scale factor is the same as multiplying by a reciprocal. This same concept is useful in solving one-step equations with fractional coefficients. To remove a fractional coefficient you may divide each term in the equation by the coefficient or multiply each term by the reciprocal of the coefficient.

To remove fractions in more complicated equations students use "Fraction Busters." Multiplying all of the terms of an equation by the common denominator will remove all of the fractions from the equation. Then the equation can be solved in the usual way.

For additional information, see the Math Notes boxes in Lesson 7.1.6 of the *Core Connections, Course 2* text or Lesson 5.2.1 of the *Core Connections, Course 3* text. For additional examples and practice see the *Core Connections, Course 3* Checkpoint 7 materials.

Example of a One-Step Equation

Solve: $\frac{2}{3}x = 12$

Method 1: Use division and common denominators

$$\frac{2}{3}x = 12$$

$$\frac{\frac{2}{3}x}{\frac{2}{3}} = \frac{12}{\frac{2}{3}}$$

$$x = \frac{12}{\frac{2}{3}} = 12 \div \frac{2}{3} = \frac{36}{3} \div \frac{2}{3} = \frac{36}{2} = 18$$

Method 2: Use reciprocals

$$\frac{2}{3}x = 12$$

$$\frac{3}{2}\left(\frac{2}{3}x\right) = \frac{3}{2}(12)$$

$$x = 18$$

Example of Fraction Busters

Solve: $\frac{x}{2}+\frac{x}{5}=6$

Multiplying by 10 (the common denominator) will eliminate the fractions.

$$10(\tfrac{x}{2}+\tfrac{x}{5})=10(6)$$
$$10(\tfrac{x}{2})+10(\tfrac{x}{5})=10(6)$$
$$5x+2x=60$$
$$7x=60 \Rightarrow x=\tfrac{60}{7}\approx 8.57$$

Problems

Solve each equation.

1. $\frac{3}{4}x=60$

2. $\frac{2}{5}x=42$

3. $\frac{3}{5}y=40$

4. $-\frac{8}{3}m=6$

5. $\frac{3x+1}{2}=5$

6. $\frac{x}{3}-\frac{x}{5}=3$

7. $\frac{y+7}{3}=\frac{y}{5}$

8. $\frac{m}{3}-\frac{2m}{5}=\frac{1}{5}$

9. $-\frac{3}{5}x=\frac{2}{3}$

10. $\frac{x}{2}+\frac{x-3}{5}=3$

11. $\frac{1}{3}x+\frac{1}{4}x=4$

12. $\frac{2x}{5}+\frac{x-1}{3}=4$

Answers

1. $x=80$

2. $x=105$

3. $y=66\frac{2}{3}$

4. $m=-\frac{9}{4}$

5. $y=3$

6. $x=22.5$

7. $y=-17\frac{1}{2}$

8. $m=-3$

9. $x=-\frac{10}{9}$

10. $x=\frac{36}{7}$

11. $x=\frac{48}{7}$

12. $x=\frac{65}{11}$